

Teachers and Students' Ideas about Sociology of Science: A Study at the Level of Primary School

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Scientists do not work isolated in boxes hermetically closed from the external environment, or develop their ideas detached from the scientific community (or even from the non-scientific one) to which they belong. But what is the role of the community, of the society direct or indirectly related to science, in the development of the scientific ideas? How are the scientific ideas influenced by social/political/economical contexts? While the historians and the sociologists of science try to answer these questions the pedagogues wonder about how to explore these aspects in the classroom in order to provide students an enlarged, embraced and closed sight of what the science really is and how is it built and developed.

The conceptual framework in which studies about school science ideas are supported – more exactly, the ideas of science, scientist and scientific work developed by students, teachers and school curriculum – are predominantly based on psychological and epistemological principles. So, we attempt to contribute to the decrease of this hiatus by enriching the investigation with theoretical framework from sociology. The study is mainly based upon Bernstein's theory (1999, 2000), that gives the concepts of *classification* and *framing* to the analysis and data interpretation.

This study aimed to recognize and understand the ideas that teachers and students of primary school have about

the different aspects of sociology of science which will allow us, to ponder about *what* and *how* can we explore such aspects in teachers' education and children's learning process in order to promote a deeper and realistic sight of the scientific enterprise.

The pattern we selected to this study was of about twenty teachers of elementary school, with different professional experience and twenty-four students attending the 4th grade (seven girls and seventeen boys), aged between nine and ten.

The teachers answered a multiple choice questionnaire with 40 questions. They had to select one option out of four: TD (Totally Disagree), Disagree (Disagree), A (Agree), TA (Totally Agree). The students answered a questionnaire with two parts, one of open questions and the other with 20 questions of multiple choices. The students had to choose one out of three options: D (Disagree), A (Agree), NT (Not know) Afterwards eight students were selected out of twenty-four to answer a semi-structured interview with similar topics. There were four boys and four girls of different social background. Some of them belonged to low social class and others to upper social class. During the interview students were shown several pictures about various scientific activities to which they were stimulated to comment.

The topics of the questionnaires and interviews were similar both to teachers and to students. They were as follows: (a) The influence of social, political and economical contexts in the development of science; (b) The existence of scientific communities and their characteristics; (c) The influence of the social group – social class, race, gender, country of origin... – in the scientists' status and credibility; (d) The existence of consensus and confrontation of beliefs between scientists and scientific communities; (e) Relationship between scientific communities and validation of knowledge.

Regarding the teachers, the results show that in a general way, although they consider that social, cultural, political and economical contexts influence the development of science and that the science is a social and communitarian enterprise, they do not clearly realize the way these communities work, investigate, influence and communicate among themselves. By and large, they also consider that the science is free of prejudice... once they state that there are equal opportunities and success in their career beyond the social group (gender, class, nationality...) of the scientists. The teachers still show confused thoughts about the existence or not of consensus and/or conflicts of beliefs between scientists and scientific communities.

Regarding the pupils, the results suggest perspectives of the scientific enterprise far from the reality. They

uphold by and large, that the social, political and economical contexts in which the science is absorbed do not interfere in their course; they also uphold that the scientists' social group does not influence their status and the access to investigation and scientific knowledge. Although the pupils declare that the scientists work mainly in a group and that the organization of group work is vital they show vague and unclear thoughts on the way these groups are organized and work. The pupils also consider that in science there is often a consensus of thoughts between the scientists and the scientific communities what seems to reveal a perspective of "normal science" and not so much of "revolutionary science". The results of the interviews brought awareness of a new fact. Through the interview we realized that boys have a more fanciful idea of science than girls. The boys emphasize the possibility of "great discoveries", "great inventions", "problem solving through science"...; on the other hand, the students of the upper class show closer ideas of what science is than the lower class ones. Students' gender and social class seem to constitute variable mediators of the view of science.

The continuities and discontinuities/cleavages between science ideas presented by teachers need to be pondered once they interfere in the way they develop their teaching and pedagogical practice, how they plan the experimental work and implement the curriculum... in short in the way they help to build students' beliefs.

In conclusion, the study gives suggestions about how the view of "conceived science" can approach to "real science".

Keywords: Science curriculum; nature of science; sociology of science; scientific community.

References

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